Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Cancelled).

2. (Currently Amended) The method of claim 12, wherein:

the *a priori* probability values are represented by $P(s_k=a_i)$, where the symbols in a symbol interval are represented by s_k, and k is an index identifying a transmit antenna; and

a_i is an ith value in an alphabet set from which the symbols take their values.

3. (Currently Amended) The method of claim 12, wherein:

the Monte Carlo samples comprise stochastic Monte Carlo samples.

4. (Currently Amended) The method of claim 12, wherein:

the probability distribution of the symbols is represented by $p(\mathbf{s} \mid \mathbf{z})$, where **s** is a vector of transmitted signal values for different transmit antennas in a symbol interval, and **z** is a vector of received signals from the different transmit antennas after nulling.

5. (Currently Amended) The method of claim 12, wherein determining the set of Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, comprises:

determining a trial sampling density for each ith value, a_i, in an alphabet set A from which the symbols take their values, using the *a priori* probability value $P(s_k=a_i)$ from a previous iteration, where the symbols are represented by s_k, and k is an index identifying a transmit antenna;

drawing the jth sample symbol $s_k^{(j)}$, from the alphabet set A, where $j=1,2,\ldots,m$, and m is a number of the Monte Carlo samples determined for the symbol interval; and

computing an importance weight $w_k^{(j)}$ for $s_k^{(j)}$.

6. (Original) The method of claim 5, further comprising:
performing resampling to obtain updated importance weights $w_k^{(j)}$.

7. (Original) The method of claim 5, further comprising:
initializing the importance weights $w_{-1}(j)=1$.

8. (Currently Amended) The method of claim 1<u>2</u>, wherein:
m is a number of the Monte Carlo samples determined for a symbol interval;
the Monte Carlo samples are represented by $\{(s_k^{(j)}, w_k^{(j)})\}$,
each *a posteriori* probability value $P(s_k=a_i \mid \mathbf{z})$ is obtained from

$$P(s_k=a_i \mid \mathbf{z})=\frac{1}{W_k}\sum_{j=1}^{m} 1(s_k^{(j)}=a_i)\, w_k^{(j)}, a_i \in \mathbf{A} \text{ where}$$

z is a vector of received signals from different transmit antennas after nulling;
the symbols are represented by s_k, where k is an index identifying a transmit antenna;
importance weights for the symbols s_k are represented by w_k;
A is an alphabet set from which the symbols take their values, and a_i is an ith value in A;

$W_k \triangleq \sum_{j=1}^{m} w_k^{(j)}$; and

1 is an indicator function defined by $1(x=a)=\begin{cases} 1, & \text{if } x=a, \\ 0, & \text{if } x \neq a. \end{cases}$.

9. (Currently Amended) The method of claim 1<u>2</u>, further comprising:
based on the *a posteriori* probability values, calculating *a posteriori* log-likelihood ratios of interleaved code bits.

10. (Currently Amended) The method of claim 1<u>2</u>, wherein:
the Monte Carlo samples comprise deterministic Monte Carlo samples.

11. (Currently Amended) The method of claim 12, wherein determining the set of Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, comprises:

calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the Monte Carlo samples determined for the symbol interval;

computing the importance weight $w_k^{(j)}$ for each symbol $s_k^{(j)}$, where k is an index identifying a transmit antenna; and

selecting and preserving m distinct data sequences with the highest weights.

12. (Currently Amended) ~~The~~ A method for demodulating data from ~~of claim 1, wherein: the channel comprises~~ a multiple-input multiple-output (MIMO) channel, comprising:

receiving *a priori* probability values for symbols transmitted across the MIMO channel;

in accordance with the *a priori* probability values, determining a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols; and

estimating *a posteriori* probability values for the symbols based on the set of Monte Carlo samples.

13. (Currently Amended) A program storage device tangibly embodying a program of instructions executable by a machine to perform a method for demodulating data from a multiple-input multiple-output (MIMO) channel, the method comprising:

receiving *a priori* probability values for symbols transmitted across the MIMO channel;

in accordance with the *a priori* probability values, determining a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols; and

estimating *a posteriori* probability values for the symbols based on the set of Monte Carlo samples.

14. (Cancelled)

15. (Currently Amended) The demodulator of claim [[14]]17, wherein:

the Monte Carlo samples comprise stochastic Monte Carlo samples.

16. (Currently Amended) The demodulator of claim [[14]]17, wherein:

the Monte Carlo samples comprise deterministic Monte Carlo samples.

17. (Currently Amended) ~~The~~ A demodulator ~~of claim 14, wherein:~~

~~the channel comprises~~ for demodulating data from a multiple-input multiple-output (MIMO) channel, comprising:

means for receiving *a priori* probability values for symbols transmitted across the MIMO channel;

means for determining, in accordance with the *a priori* probability values, a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols; and

means for estimating *a posteriori* probability values for the symbols based on the set of Monte Carlo samples.

18. (Cancelled)

19. (Currently Amended) The receiver of claim [[18]]20, further comprising:

a bit log likelihood ratio computer that is responsive to the *a posteriori* probability values for determining *a posteriori* log-likelihood ratios (LLRs) of the bit data.

20. (Currently Amended) ~~The~~ A receiver ~~of claim 18, wherein:~~

~~the channel from which the data is received is~~ for receiving data from a multiple-input multiple-output (MIMO) channel, comprising

a soft outer channel decoder;

a soft inner demodulator; and

a symbol probability computer; wherein:

the symbol probability computer calculates *a priori* symbol probability values based on bit data received from the soft outer channel decoder; and

the soft inner demodulator, in accordance with the *a priori* probability values, determines a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols, and estimates *a posteriori* probability values for the symbols based on the set of Monte Carlo samples.

21. (Currently Amended) A method for demodulating data from a channel, the channel comprising a multiple-input multiple-output (MIMO) channel, the method comprising:

(a) receiving *a priori* probability values for symbols transmitted across the channel;

(b) in accordance with the *a priori* probability values, determining a set of deterministic Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, weighted with respect to a probability distribution of the symbols, by:

~~(b)~~(1) calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the deterministic Monte Carlo samples determined for the symbol interval;

~~(b)~~(2) computing the importance weight $w_k^{(j)}$ for each symbol $s_k^{(j)}$, where k is an index identifying a transmit antenna; and

~~(b)~~(3) selecting and preserving m distinct data sequences with the highest weights; and

(c) estimating *a posteriori* probability values for the symbols based on the set of deterministic Monte Carlo samples; wherein:

(d) the probability distribution of the symbols is represented by $p(\mathbf{s} \mid \mathbf{z})$, where **s** is a vector of transmitted signal values for different transmit antennas in a symbol interval, and **z** is a vector of received signals from the different transmit antennas after nulling.

22. (Currently Amended) A method for demodulating data from a channel, the channel comprising a multiple-input multiple-output (MIMO) channel, the method comprising:

(a) receiving *a priori* probability values for symbols transmitted across the channel;

(b) in accordance with the *a priori* probability values, determining a set of deterministic Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, weighted with respect to a probability distribution of the symbols, by:

(b)(1) calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the deterministic Monte Carlo samples determined for the symbol interval;

(b)(2) computing the importance weight $w_k^{(j)}$ for each symbol $s_k^{(j)}$, where k is an index identifying a transmit antenna; and

(b)(3) selecting and preserving m distinct data sequences with the highest weights;

(c) estimating *a posteriori* probability values for the symbols based on the set of deterministic Monte Carlo samples; wherein:

(d) wherein the probability distribution of the symbols is represented by $p(\mathbf{s} \mid \mathbf{z})$, where **s** is a vector of transmitted signal values for different transmit antennas in a symbol interval, and **z** is a vector of received signals from the different transmit antennas after nulling;

(e) wherein m is a number of the deterministic Monte Carlo samples determined for a symbol interval;

each *a posteriori* probability value $P(s_k=a_i \mid \mathbf{z})$ is obtained from

$$P(s_k=a_i \mid \mathbf{z})=\frac{1}{W_k}\sum_{j=1}^{m} 1(s_k^{(j)}=a_i)\, w_k^{(j)},\quad a_i \in A \text{ where}$$

z is a vector of received signals from different transmit antennas after nulling;

A is an alphabet set from which the symbols take their values, and a_i is an ith value in A;

$W_k \triangleq \sum_{j=1}^{m} w_k^{(j)}$; and

1 is an indicator function defined by $1(x=a)=\begin{cases} 1, & \text{if } x=a, \\ 0, & \text{if } x \neq a. \end{cases}$.

and

(f) calculating, based on the *a posteriori* probability values, *a posteriori* log-likelihood ratios of interleaved code bits.